Reprinted from HortScience, Vol. 21(1), February 1986
A publication of the American Society for Horticultural Science, Alexandria, Virginia

The Tomato Processing Industry in Portugal

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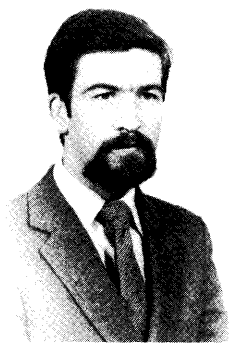
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Portugal is a major producer of tomatoes for processing. Its export industry now ranks 4th worldwide; before the strongly protectionist European Common Market policy initiated in the early 1970s it ranked 3rd (Table 1). The culture of tomatoes for processing in irrigated areas of Portugal is favored by the dry, warm summer that characterizes Mediterranean climates. In addition the summer in Portugal is not too hot for a good tomato set (Table 2).

Received for publication 6 July 1984. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

History

Little or no commercial production of tomato paste existed before World War II. Housewives produced their own tomato sauces from low-priced fresh tomatoes bought at the peak of the season. This tradition, which involves chopping, boiling, and preserving the tomatoes with salicylic acid, continues today. The internal Portuguese market is consequently small, and more than 90% of the tomato paste produced there is exported to the United States, European Economic Community (EEC), Scandinavia, the USSR, and other countries. Peeled tomatoes represent less than 10% of raw-material deliveries to canneries, and few if any are exported.

The production of tomato paste in Portugal dates back to 1939 (Table 1). The first efforts in the Tagus Valley (Fig. 1) were on a limited scale, using surplus fruits otherwise destined for the fresh market. In 1945 about 300 ha were planted, with a production of 800 MT of paste (28–30% solids). Subsequent development was slow due to the poor quality of the final product and consequent difficulties in marketing.

With concerted efforts by Portuguese authorities since 1956 through the Junta Nacional das Frutas (Fruit & Vegetable Marketing Board) and private enterprises (under the leadership of M. Costa Braga), and with the active support of the H.J. Heinz and the Campbell Soup companies, field and processing productivity rapidly increased.

Table 1. Number of processors, acreage, yield and production for Portuguese tomato industry.

Year	No. processors	Area (ha)	Average yield (MT·ha)	Tons delivered (MT)	Tomato paste °B[z] (MT)	Ratio of tons delivered (°B)
1939	1	300	21.3	6400	800	8.0
1956	4	900	26.9	25,000	3000	8.3
1956–1960	9	1500	25.6	38,800	6600	5.9
1961–1965	15	6100	35.5	219,100	39,900	5.5
1966–1970	31	20,800	35.4	733,500	135,900	5.4
1971–1975	27	23,100	33.0	758,500	139,700	5.4
1976–1980	26	19,800	37.8	551,100	94,900	5.8
1981–1982	26	15,600	28.3	441,300	72,600	6.1
1983	24	19,900	24.1	480,000	90,000	5.3
1984	24	19,500	36.3	707,800	123,800	5.8

[z]°B = 28%.

Some Portuguese technicians gave special support to this task; Weber de Oliveira, then an officer of the Ministry of Agriculture, completed the remarkable task of transferring the technology.

Competitive prices and excellent quality increased demand and subsequent expansion. From 1956 to 1966, yields rose from 27 to 40 MT·ha^{-1} and total production rose from 25,000 to 800,000 MT of fresh fruit. During this period, tomato cultivation was introduced into new areas, including the valleys of Sado, Caia, and Liz (Fig. 1). Expansion was so rapid that the number of canneries outgrew the supply of raw material.

Processing capacity continued to increase in the ensuing years (1966–1970), but a practical limit for the provision of raw material was soon reached, and subsequent levels of production have decreased steadily. This decrease was caused by many factors, including increased competition for supply of raw material and the volatile nature of the market. The social and economic turmoil that resulted from the sharp political changes in 1974–1975 led to a further decline. Most of the canneries are owned by Portugese shareholders; 5 are cooperatives and the remaining ones vary from large corporations to family-owned operations. The tomato industry now involves about 50,000 people. This number includes 3000–5000 small, mostly tenant, farmers ("seareiros"). Factors that sharply increased production areas and the number of processing plants were the suitable climate, inexpensive labor, a need for alternative crops in newly created irrigation districts, and an interest by multinational food companies in developing the industry.

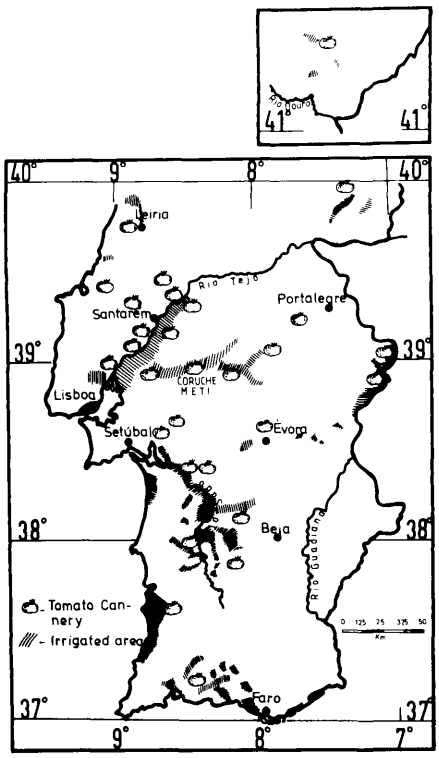

Fig. 1. Irrigated areas and tomato-processing plants in Portugal; Meti trials.

Industry

Processing tomatoes are produced in alluvial and colluvial soils (Entissols, Fluvents, Xerofluvents) that comprise more than 60% of all growing areas. The other 40% have other types of soils, such as Pgm and Pg (Inceptisols, Ochrepts, Xerochrepts), Pmg (Alfisols, Xeralfs, Typic Haploxeralfs), and Pag (Alfisols, Xeralfs, Aquic Haploxeralfs). Elevations range between 50 m (Coruche, Alcácer do Sal) and 208 m above sea level (Elvas).

In the beginning the most important cultivars were 'Ace' and 'ES-58', which dominated until the 1970s, with 'ES 24', 'H 1409', 'Roma VF', and 'H 1706' in a subsidiary position. The main cultivars now are 'H 30', 'Rio Grande', 'H 530', 'Cal-j', and 'ES 58'. The number of fruits per kg varies from 6 to 10, Brix from 5 to 5.6, and pH from 4.2 to 4.4 for these cultivars in an average year.

Field operations start with seed-bed preparation in late autumn (October–November) or, more commonly, in February–March before planting. Most growers use transplants provided by processors or grown by farmers inside polyethylene tunnels where seeds are sown from the end of January to the middle of February. Transplanting occurs 6–10 weeks later. Field planting begins in the middle of March and proceeds to the end of May. Direct seeding, which represents only 5% of the total acreage, is done from late February until the beginning of May. The growing season is from March until the middle of September. The main rotations are a) tomato–melon (2 years), b) melon–tomato–wheat (3 years), and c) tomato–wheat (2 years).

Tomato rows are usually 1.52 m apart but range from 1.45 to 1.62 m. The plant population ranges from 30,000 to 100,000 per ha according to the canopy of the cultivar. All tomatoes for processing are furrow-irrigated at 4000–8000 m^3·ha^{-1}. Land is not level enough for surface irrigation. Sprinkling is uncommon because electricity is not available on most farms. Hand-harvesting, which starts in mid-July and proceeds until the middle of October, or even November in some years, is an advantage in a country where one-fourth of the active population is still in the primary sector and all the gas and most of the agricultural machines are imported.

Late blight caused by *Phytophthora infestans* (Mont.) d By. and oidium caused by *Leveillula taurica* are unimportant under these conditions and almost do not exist. The tomato crop usually does not suffer from bacterial diseases, except for bacterial spot [*Xanthomonas vesicatoria* (Doidge) Dows.], which appears only in the occasional years

Table 2. Climatic data for rainfall and temperature in Portugal (1931–1960)

Months	Santarem Rainfall (mm)	Santarem Temp (°C) Max	Santarem Temp (°C) Min	Evora Rainfall (mm)	Evora Temp (°C) Max	Evora Temp (°C) Min	Beja Rainfall (mm)	Beja Temp (°C) Max	Beja Temp (°C) Min
January	96	<14>	5	93	12	5	<72>	<13>	5
February	69	15	5	65	13	6	53	14	5
March	<106>	18	8	<102>	15	8	90	17	7
April	57	21	9	57	18	9	50	20	9
May	44	23	<11>	49	21	<11>	38	23	<10>
June	25	27	13	15	26	14	15	18	13
July	4	30	15	5	30	15	1	32	15
August	4	31	15	3	30	16	2	31	16
September	53	28	14	27	26	15	21	28	15
October	63	23	12	61	21	12	50	23	12
November	89	18	8	80	16	9	68	17	8
December	97	14	6	90	12	6	85	13	5
Total	707	---	---	647	---	---	545	---	---
Average	---	22	10	---	20	10	---	21	10

O Clima de Portugal, fasciculo XIII, Inst. Nac. de Meteorologia, Lisboa, 1965. Data from (1).

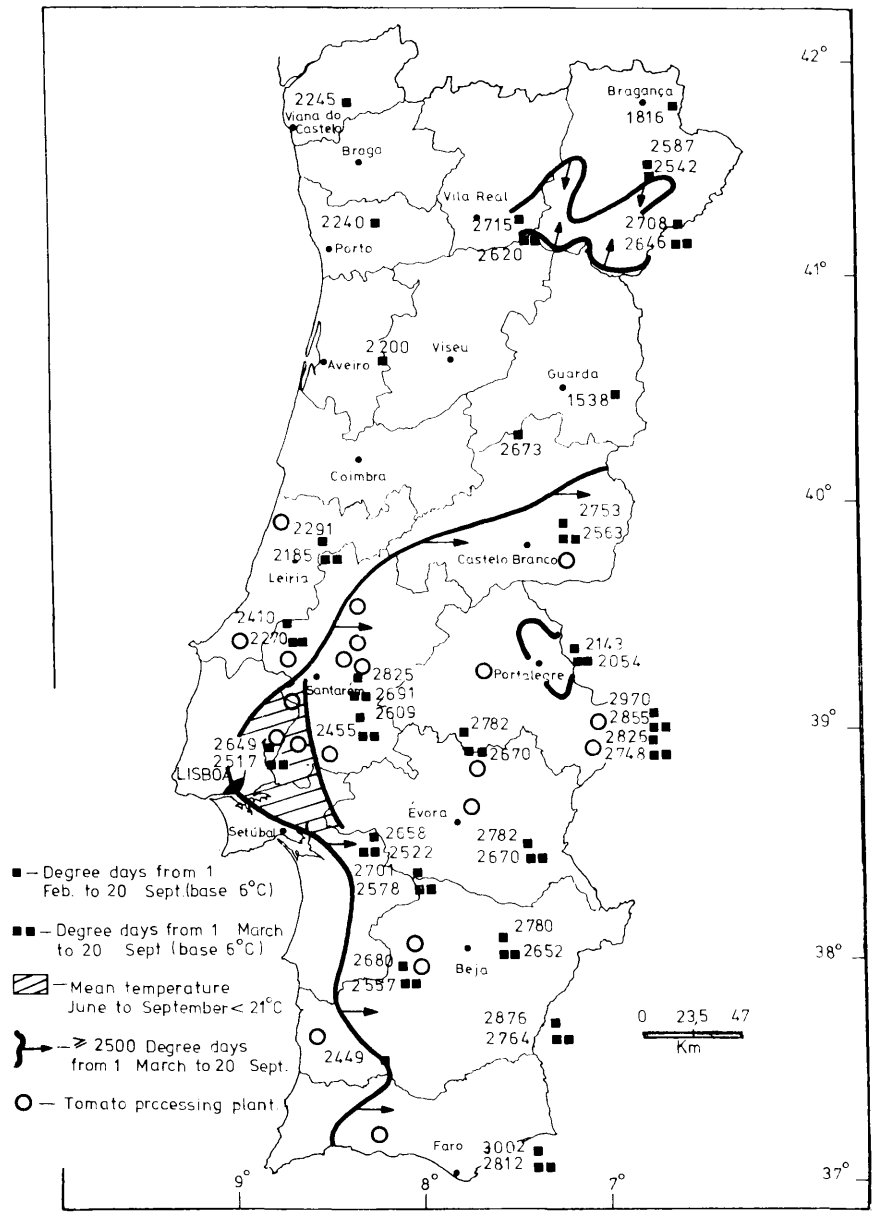

Fig. 2. Most suitable areas for tomato production in Portugal (3).

when imported seeds are used. A mycoplasma, "blue disease", occurs every few years. The main disease is early blight [*Alternaria solani* (Ell. & G. Martin) Sor.], controlled with one to 4 sprays of mancozeb, zineb, ziram, captan, Zn, propineme, maneb, or Cu.

The main pests are tomato fruit worm (*Heliothis armigera* Hiibner), aphids (*Macrosiphion euphorbiae* Thomas), and mites (*Aculus lycopersicy* Massee, *Tetranychus telarius* L.). These are controlled by endosulfar, synthetic pyrethrins, and S (mites).

Research

A research project, Mechanized Production of Tomatoes for Processing (METI), was established in the early 1970s under the leadership of the Univ. of Evora and with funds provided by the National Board for Scientific and Technological Research and several canneries. This project also included the cooperation of the agricultural division of H.J. Heinz in Portugal, which supports the only active breeding program on processing tomatoes in Portugal. Scientific and technical work was periodically published in its bulletin *Divulgando*. The first International Symposium on Production of Tomatoes for Processing, organized with the support of the International Society for Horticultural Science, was held in Evora in 1979 (2).

One of the priorities in METI research was to define the most suitable production areas for processing tomatoes, for both the traditional techniques and direct seeding (Fig. 2). A large area was chosen in the interior, south of the Tejo River (Ribatejo and Alentejo), where production depends on irrigation because summers are quite dry. Unfortunately some canneries were located far from the best locations (Fig. 2).

Specialized and regional branches of the Ministry of Agriculture have always actively supported METI research. The METI experimental fields are located in several irrigation districts but mainly at Coruche (Fig. 1). Recently METI established close links with similar programs in the Spanish Estremadura, the main Spanish production area for tomato paste and powder, which is close to the Alentejo area. A Portuguese–Spanish joint program called METIBER was created from this collaboration, also including the Dept. of Agricultural Engineering of the Politechnical Univ. of Madrid.

Significant progress has been made in agricultural techniques in the last 10 years. Cultivars have changed from the soft and multiharvested 'ES-58' to the modern firm and concentrated cultivars, such as 'H-30 L' and 'Cal-j'. The number of hand-harvests has decreased from 4 or 5 to one or 2. Bulk transport predominates and direct seeding has been introduced. Mechanical harvesters have been built and some have been exported.

The future of this industry depends on the nature of future agreements between Portugal and EEC. In the mid-1970s the EEC — the traditional and main purchaser of Portuguese tomato paste — introduced a policy that including massive subsidies for production in community countries (Italy, Greece, and France) but penalizing imports from other countries (such as Portugal) with tarifs and quotas. Portugal, however, is a candidate for admission to EEC with a high probability of admission in the near future, and optimism for the future of Portugal's tomato industry is high. Last June, Portugal signed the treaty of admission to EEC.

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